KNOWLEDGE PROBE 2: CONTEMPORARY WIRELESS TECHNOLOGY: CELL PHONES, WIRELESS LOCAL AREA NETWORKS, AND SHORT-RANGE RADIO
Access and Duplexing

Learning Objectives
1. Define frequency reuse.
2. Differentiate between the access methods used in wireless communication.
3. Identify components used in different access circuits.
4. Describe the differences between frequency division duplexing and time division duplexing.

1. The best definition of the frequency reuse concept in cellular systems is:
   a. Many base stations can use the same frequency if they are spaced far enough apart, use lower antennas, lower power, and sectorized antennas
   b. Multiple subscribers can use the same frequencies but at busy times they must limit their calling time
   c. Subscribers can use the same frequency but have to wait their turn
   d. Subscribers use the same frequency but must use a time division multiplexed system to do so

2. Which type of access method uses the same bandwidth but divides it into smaller multiple channels?
   a. CDMA
   b. FDMA
   c. SDMA
   d. TDMA

3. What condition must exist to use TDMA and CDMA?
   a. Signals must be analog
   b. Signals must be digital
   c. Signals must share a common channel
   d. Signals must use the same type of modulation

4. What is the minimum sampling rate in an analog-to-digital converter that will preserve the signal content to transmit hi fi audio with an upper frequency limit of 20 kHz?
   a. 10 kHz
   b. 20 kHz
   c. 30 kHz
   d. 40 kHz

5. Transmitting sequential binary words representing the sequential samples of an analog signal is called
   a. ADC
   b. CDMA
   c. PCM
   d. TDMA

6. What is the data rate if the bit time for a serial digital signal is 12.5 µS?
   a. 12.5 kHz
   b. 80 kHz
   c. 125 kHz
   d. 384 kHz

7. A circuit that take a serial digital signal and compressed it into fewer bits for faster transmission is called a(n)
   a. Analog-to-digital converter
   b. Equalizer
   c. Multiplexer
   d. Vocoder

8. In a TDMA system, the digital words representing the voice signals from multiple subscribers are transmitted
   a. In groups of words from each source
   b. One after another until all are transmitted then the process is repeated
   c. Simultaneously
   d. With all of the first bits transmitted, then all the second bits transmitted, then all the third bits and so on

9. What circuit is used to recover the original analog signal from a TDMA system?
   a. Analog-to-digital converter
   b. Demultiplexer
   c. Digital-to-analog converter
   d. Vocoder

10. What is the name of the signal used to spread the lower frequency digital voice signal in a CDMA system?
    a. Chipping code
    b. Clock
    c. Random hop sequence
    d. Vocoder output

11. If multiple CDMA signals share a common bandwidth, how is one signal distinguished from another?
    a. A band pass filter is used
    b. A demultiplexer is used
    c. A pseudo random code can be recognized
    d. TDMA is part of the process

12. What component of a wireless system makes it possible to implement SDMA?
    a. Directional antenna
    b. Frequency reuse scheme
    c. Highly selective receiver
    d. Transmitter with a very narrow bandwidth

13. Full duplex means
    a. 2-way communications but subscribers can transmit and receive simultaneously
    b. 2-way communications but subscribers take turns transmitting and receiving
    c. Transmission is one way only
    d. Two or more conversations can take place at the same time

14. To implement FDD
    a. All signals must be analog
    b. Alternate time slots are needed in a TDMA system
    c. CDMA must be used
    d. Two separate channels, receive and transmit, must be used

15. To implement TDD,
    a. All signals must be analog
    b. Alternate time slots are needed on a single channel
    c. CDMA must be used
    d. Two separate channels, receive and transmit, must be used